

## PATENT ABSTRACTS OF JAPAN

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## (54) STRETCH FILM FOR PACKAGING FOOD

## (57)Abstract:

PROBLEM TO BE SOLVED: To provide a stretch film for packaging a food at a low cost capable of finishing good packaging by incorporating excellent transparency, delayed stress developing characteristic and excellent packaging workability.

SOLUTION: In the stretch film for packaging a food comprising at least three layers of a central layer and both outer surface layers, at least one of the central layer is formed of a resin composition containing a mixture of a crystalline polypropylene resin having a flexural modulus of 200 to 500 N/mm<sup>2</sup> and a petroleum resin having a softening point of 130° C or higher or its hydrogen-additive of 60 to 95:40 to 5 of weight ratio as a main body, a total layer thickness of 7 to 15  $\mu$ m and a layer ratio of the central layer of 40 to 90%. In this case, the composition may contain an amorphous polypropylene resin having a flexural modulus of 500 N/mm<sup>2</sup> or less.

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CLAIMS

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[Claim(s)]

[Claim 1] It is the stretch film for food packing which consists of at least three layers of a main layer and both external layers. At least one layer of the above-mentioned main layer consists of resin constituents which made the subject mixture of the weight rate of 60-95:40-5 with the crystalline polypropylene resin of 2 and petroleum resin of 130 degrees C or more of softening temperatures with a bending elastic modulus of 200-500Ns [/mm ], or its hydrogenation object. Moreover, the stretch film for food packing which both the above-mentioned external layers consist of polyethylene system resin, and is characterized by for the total thickness being 7-15 micrometers, and the layer ratio of a main layer being 40 - 90%.

[Claim 2] The stretch film for food packing according to claim 1 with which a resin constituent contains a with a bending elastic modulus [ or less / 500Ns //mm / 2 ] amorphous polypropylene resin, and the blending ratio of coal of this amorphous polypropylene resin is characterized by being the weight rate of 0-40 to the mixture 100-60 of a polypropylene resin, petroleum resin, or its hydrogenation object.

[Claim 3] The stretch film for food packing according to claim 2 characterized by for an amorphous polypropylene resin being the copolymer of a propylene and butene-1, and the copolymerization rate of butene-1 being 20 or less % of the weight of an amorphous polypropylene resin.

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DETAILED DESCRIPTION

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## [Detailed Description of the Invention]

## [0001]

[Field of the Invention] This invention relates to the stretch film for food packing. Furthermore, it is related with the stretch film for food packing which makes a subject the polyolefine system resin which was excellent in package workability and stretchable [ of package workmanship / good ] in detail.

## [0002]

[Description of the Prior Art] Food, such as garden stuff, a fresh fish, and prime meat, is put into a tray, and the method packed [ is covered and ] and sold with the film for a package (stretch film) from on the is used abundantly in the supermarket etc. this package is put from on the tray containing food, carrying out the stretch of the stretch film, it is a tray bottom outside side, and films are carried out by joining superposition (being the so-called -- it overlapping -- making) and its part. Although this package is performed manually or the automatic packer is performing, in an automatic package, whether this package can be performed smoothly and whether it becomes workmanship beautiful again especially depend at the property of a stretch film.

[0003] Although the plasticized-polyvinyl-chloride film of 2 has been conventionally used abundantly the bending modulus of elasticity of 80-180Ns/mm at this stretch film, it begins to be regarded as questionable generating hydrogen chloride gas at the time of incineration, that the contained plasticizer may be eluted, etc., therefore a polyvinyl chloride film is a non-plasticizer, and development of the resin film which replaces a polyvinyl chloride film, especially a polyolefine system resin film is furthered. Although the stretch film improved [ thing / which the low-density-polyethylene resin stretch film and the ethylene-vinylacetate copolymer stretch film were proposed / thing /, and the copolymer of ethylene and/or a propylene, and alpha olefins, such as butene-1, a hexene -1, and 4-methyl pentene -1, was further used / thing / as the main layer, for example, and made the ethylene-vinylacetate copolymer layer form in the both sides ] is proposed, There is a problem in points, such as stretchable, transparency, flexibility, deformation recoverability, and cut nature, and the same outstanding package workability as the case where it is a polyvinyl chloride system resin stretch film, and package workmanship cannot be acquired.

[0004] Furthermore, using the mixture of polypropylene and petroleum resin for the stretch film for food packing in recent years is proposed. That is, a main layer consists of a resin constituent containing the propylene system polymer which has the specific amount of heat of crystallization and petroleum resin, terpene resin, coumarone-indene resin, rosin resin, or those hydrogenation derivatives, and the multilayer stretch film for a package with a specific storage modulus and a specific loss tangent is proposed (JP,9-154479,A). Moreover, both external layers consist of ethylene system polymers, and the stretch film for food packing with which a main layer consists of mixture of amorphous polypropylene and crystalline polypropylene and a resin constituent which contains petroleum resin or its hydrogenation derivative in a list is proposed (JP,11-115122,A).

[0005] By the way, the homopolymer of the criterion of a propylene has about 1300Ns /of bending elastics modulus of 2 (measurement by JISK7208) mm. Thus, the polypropylene with a

large bending modulus of elasticity is too hard as a raw material of a stretch film, even if a stretch film made from this blends petroleum resin etc., it cannot carry out a stretch smoothly with automatic packaging machinery, therefore causes trouble to a package, and package workmanship is not enough [ a stretch film ], either. Then, in the stretch film for food packing made from a propylene system polymer, the propylene system polymer which has the bending modulus of elasticity of two or less [ 200Ns //mm ] equivalent to plasticized polyvinyl chloride from the former attracted attention, and it has been adopted from the thing usable as it is with the stretch wrapping machine which was adapted for plasticized polyvinyl chloride. However, when it hangs on a stretch wrapping machine even if it blends petroleum resin etc. since a with a bending elastic modulus [ or less / 200Ns //mm / 2 ] propylene system polymer has large rubber elasticity, it has the so-called difficulty which is hard to overlap (it will return by the time it carries out welding, even if it makes it overlap), and, generally its cost is high. In addition, with two or less [ 200Ns //mm ] bending elastic modulus, although cost of atactic polypropylene is also cheap, since it contains a low molecular weight constituent, if it is blended so much, a low molecular weight constituent will carry out bleeding of it on the surface of a stretch film, and it has the trouble of clouding a film.

[0006] Moreover, in the stretch film for food packing, although petroleum resin or its hydrogenation object is blended with the propylene system polymer used as a main layer, give the retarded elasticity to a film, raise glass transition temperature, the crystallinity of a propylene system polymer is reduced or it is known that there is an operation which raises the extensibility in ordinary temperature, petroleum resin or its hydrogenation object carries out bleeding on the surface of a stretch film, and there is a trouble of clouding a film.

[0007]

[Problem(s) to be Solved by the Invention] This invention was made in view of the above-mentioned situation, has the outstanding transparency, has stress delay manifestation nature, and aims at offering the stretch film for food packing with comparatively cheap cost which is excellent in package workability and can acquire good package workmanship.

[0008]

[Means for Solving the Problem] this invention persons use the resin constituent containing a propylene system polymer and petroleum resin, or its hydrogenation object as a main layer. The result which took lessons from the stretch film for food packing which prepared the ethylene system polymer layer in both the outside and which was inquired variously, When the comparatively high petroleum resin which a bending elastic modulus uses 200-500Ns /of propylene system polymers of 2 for a raw material mm, and softening temperature says to this as 130 degrees C or more, or its hydrogenation object is mixed Transparency was good, carried out the knowledge of excelling in package workability and being able to obtain the good stretch film which carries out package \*\*\*\*\*, and completed this invention.

[0009] Namely, this invention is a stretch film for food packing which consists of at least three layers of a main layer and both external layers. At least one layer of the above-mentioned main layer consists of resin constituents which made the subject mixture of the weight rate of 60-95:40-5 with the crystalline polypropylene resin of 2 and petroleum resin of 130 degrees C or more of softening temperatures with a bending elastic modulus of 200-500Ns [/mm ], or its hydrogenation object. Moreover, it is the stretch film for food packing which both the above-mentioned external layers consist of polyethylene system resin, and is characterized by for the total thickness being 7-15 micrometers, and the layer ratio of a main layer being 40 - 90%. Moreover, the above-mentioned resin constituent contains a with a bending elastic modulus [ or less / 500Ns //mm / 2 ] amorphous polypropylene resin, and this invention is a stretch film for food packing whose blending ratio of coal of this amorphous polypropylene resin is a weight rate of 0-40 to the mixture 100-60 of a polypropylene resin, petroleum resin, or its hydrogenation object. The above-mentioned amorphous polypropylene resin is the copolymer of a propylene and butene-1, and its copolymerization rate of butene-1 is [ 20 or less % of the weight of an amorphous polypropylene resin ] desirable.

[0010]

[Embodiment of the Invention] This invention is a stretch film for food packing which consists of

at least three layers of a main layer and both external layers. At least one layer of the above-mentioned main layer consists of resin constituents which make a subject mixture which contains bending elastic-modulus the crystalline polypropylene resin, the petroleum resin of 130 degrees C or more of softening temperatures, or its hydrogenation object of 2 of 200–500Ns/mm at a weight rate of 60–95:40–5. The weight rate of the mixture of the crystalline polypropylene resin occupied in this resin constituent, petroleum resin, or its hydrogenation object is 60 % of the weight or more preferably 50% of the weight or more. Moreover, it is good to \*\*\*\* more preferably the rate of occupying in the above-mentioned resin constituent of the above-mentioned crystalline polypropylene resin to 50% of the weight or more. in addition, the above-mentioned bending elastic modulus -- a measuring method given in JIS K7208 -- it is the measured value.

[0011] Generally the crystalline polypropylene resin of 2 constructs a bridge the bending elastic modulus of 200–500Ns/mm in the soft segment to which copolymerization of the hard segment which consists of polypropylene and a propylene and ethylene, or the alpha olefin (except for a propylene) was carried out. After carrying out the polymerization of a hard segment and the soft segment independently, a bridge can be made to be able to construct, or the polymerization of a hard segment and the soft segment is carried out, they can be made to be able to construct a bridge in one polymerization process, and it can manufacture. Although what was manufactured by the former manufacture approach is inferior to transparency, as for what was manufactured by the latter manufacture approach, transparency is used preferably well. This crystalline polypropylene resin is marketed by the brand name of "KATAROI KS-221P" and "KATAROI KS-081P" for example, from Montel JIEPIO, Inc.

[0012] This bending elastic modulus of 200–500Ns/mm, since the crystalline polypropylene resin of 2 is excellent in transparency and has an advantage with cheap cost, it is suitable. Moreover, even if it adds the petroleum resin or its hydrogenation object of 130 degrees C or more of softening temperatures, when hanging and packing to automatic packaging machinery, the so-called overlap nature is bad, since the rubber elasticity of this resin is strong when a with a bending elastic modulus [ or less / 200Ns //mm / 2 ] crystalline polypropylene resin is used. Moreover, when a with a bending elastic modulus [ or more / 500Ns //mm / 2 ] crystalline polypropylene resin is used and it hangs and packs to automatic packaging machinery even if it adds the petroleum resin or its hydrogenation object of 130 degrees C or more of softening temperatures since this resin is hard, it is hard to overlap, and Siwa is caused or it escapes from the belt of packaging machinery. The activity of the crystalline polypropylene resin of 2 is desirable the bending elastic modulus of 200–300Ns/mm from a viewpoint of this overlap nature.

[0013] The petroleum resin used by this invention or its hydrogenation object is thermoplastics which carried out the polymerization of the decomposition oil fraction generated by the pyrolysis of petroleum, and was solidified. There are a fat group system which used C5 fraction as the raw material, an aroma group system which used C9 fraction as the raw material or both copolymerization system, and a dicyclopentadiene system. Moreover, what hydrogenated these is used. This petroleum resin or its hydrogenation object is marketed by brand names, such as Al Cong (the Arakawa chemical-industry incorporated company make), high RETTSU, and PETOROJIN (all are the Mitsui Chemicals Industries make). Hydrogenated C9 system petroleum resin is used preferably. moreover, softening temperature -- \*\* 130 degrees C or more -- a thing 140 degrees C or more is used preferably. Thus, if the high petroleum resin or its hydrogenation object of softening temperature is used, since will compare when softening temperature uses a less than 130-degree C thing, and stress delay manifestation nature will size-come to come and it will further be hard coming to carry out bleeding, transparency is good.

[0014] Moreover, the rate with the crystalline polypropylene resin of 2, petroleum resin, or its hydrogenation object is a weight rate of 60–95:40–5 the bending elastic modulus of 200–500Ns/mm. The rate of a crystalline polypropylene resin passes with bleeding at 60 or less % of the weight, transparency gets worse by the time, and at 95 % of the weight or more, since stress delay manifestation nature is insufficient, overlap nature is bad.

[0015] Although at least one-layer main layer consists of a resin constituent which contains as a

subject the mixture which mixed the bending elastic-modulus the crystalline polypropylene resin, the above-mentioned petroleum resin of 130 degrees C or more of softening temperatures, or its above-mentioned hydrogenation object of 2 of 200-500Ns/mm at a weight rate of 60-95:40-5, it may blend a with a bending elastic modulus [ or less / 500Ns //mm / 2 ] amorphous polypropylene resin with this resin constituent. Cost can be lowered by blending this amorphous polypropylene resin. The mixture of a crystalline polypropylene resin, petroleum resin, or its hydrogenation object and the blending ratio of coal with the above-mentioned amorphous polypropylene resin are 100-60:0-40 (weight section).

[0016] The above-mentioned amorphous polypropylene resins are a polypropylene and propylene-ethylene copolymer, a propylene-butene-1 copolymer, a propylene-butene-1-ethylene copolymer, propylene-hexene-1 copolymer, etc. Especially, it is the copolymer of a propylene and butene-1 and 20 or less % of the weight of an amorphous polypropylene resin has the desirable copolymerization rate of butene-1. That by which these are marketed by the brand name of UBETAC UT 2780 and UBETAC UT 2385 from Ube Rexene, Inc. is used.

[0017] In this invention, the layer which consists of polyethylene system resin as both external layers of a main layer is prepared. This polyethylene system resin For example, ethylene propylene rubber, An ethylene-butene-1 copolymer, ethylene-pentene-1 copolymer, Ethylene-hexene-1 copolymer, an ethylene-vinylacetate copolymer, An ethylene methyl-acrylate copolymer, an ethylene ethyl-acrylate copolymer, An ethylene acrylic-acid copolymer, an ethylene methacrylic acid methyl copolymer, An ethylene methacrylic acid ethyl copolymer, an ethylene methacrylic acid copolymer, an ethylene methacrylic acid ethyl copolymer, ionomer resin, low density polyethylene, and a line -- they are resin films, such as low density polyethylene, super-low density polyethylene, medium density polyethylene, and high density polyethylene. Since the stretch film for food packing can be created without spoiling the property of the main layer which especially the ethylene-vinylacetate copolymer film mentioned above, it is desirable.

[0018] 7-15 micrometers of sum totals of the thickness of a main layer and the thickness of the layer of the both sides, i.e., the total thickness of a stretch film, is 8-12 micrometers preferably. Moreover, the percentage of the thickness of a main layer to the layer ratio, i.e., total thickness, of a main layer is 50 - 80% preferably 40 to 90%. Moreover, even if the thickness of both outer layers is the same, it may differ.

[0019] In order to give the property for which it asks as a stretch film for food packing, for example, fog resistance, antibacterial, slippage, adhesiveness, etc. to this invention film, it is desirable to blend an antifogger, an antimicrobial agent, lubricant, a binder, etc. if needed. As an antifogger, monochrome or diglycerol fatty acid ester, polyglyceryl fatty acid ester, a sorbitan fatty acid ester, sucrose fatty acids ester or these ethyleneoxide addition products, the polyoxyalkylene ether, etc. are used. Aliphatic series system hydrocarbon resin, rosin, aromatic series system petroleum resin, etc. are used for a tackifier.

[0020] The stretch film for food packing of this invention is manufactured by inflation molding or extrusion molding using a T die, as the resin constituent which contains as a subject the mixture with which the crystalline polypropylene resin and softening temperature of 2 mixed petroleum resin or its hydrogenation object 130 degrees C or more at a weight rate of 60-95:40-5 the bending elastic modulus of 200-500Ns/mm is used as a main layer and an ethylene system polymer is located in the both-sides side. In the case of inflation molding, the mold goods of the acquired shape of the tube are cleared, and it is made a film. Then, this film is cut out to predetermined width of face, and it rolls round on a roll, and considers as a product.

[0021]

[Working Example(s) and Comparative Example(s)] The stretch film for food packing was manufactured by each presentation rate shown in one to examples 1-7 and example of comparison 4 table 1, and class thickness. In a table 1, EVA is the ethylene-vinylacetate copolymer of 15.8 % of the weight of vinyl acetate units. KATAROI KS-221P (brand name) and KATAROI KS-081P (brand name) are crystalline polypropylene made from Montel JIEPIO, Inc., and 270Ns /of the bending elastic modulus are [ mm ] 2 and 350N/mm<sup>2</sup>, respectively. PERT-310J (brand name) are a low crystallinity propylene system polymer by Tokuyama, Inc., it is the

block copolymer of a propylene-ethylene-propylene mold, and 160Ns /of the bending elastic modulus are [ mm ] 2. No BUREN WF 732-1 (brand name) is a crystalline propylene polymer by Sumitomo Chemical Co., Ltd., it is the propylene-ethylene random copolymer of 97 % of the weight of contents of a propylene unit, and 1200Ns /of the bending elastic modulus are [ mm ] 2. UBETAC UT 2780 (brand name) is amorphous polyolefine system resin by Ube Rexene, Inc., it is the propylene-butene-1 copolymer which contains [ a propylene ] 35 % of the weight for 65 % of the weight and butene-1, and 110Ns /of bending elastics modulus are [ mm ] 2. Moreover, Al Cong P-140 (brand name) and Al Cong P-125 (brand name) are alicycle group saturated hydrocarbon resin by Arakawa chemical-industry incorporated company, and softening temperatures are 140 degrees C and 125 degrees C, respectively.

[0022] The resin constituent shown in a table 1 was used for the main layer, the ethylene-vinylacetate copolymer which blended 2 % of the weight of antifogger glycerol oleate was used for the outer layer, and the stretch film for food packing was created. That is, the above-mentioned resin constituent was used as the main layer, inflation molding was extruded and carried out with the round-head die so that the ethylene-vinylacetate copolymer of an outer layer might be located in the both sides, and the main layer and the outer layer of the both sides created the stretch film for food packing of the thickness shown in a table 1, respectively, rolled round on the roll, and considered as the product.

[0023] The omission from bleeding, \*\*\*\*\*, overlap nature, the wrinkling of a tray, the tear at the time of a package, and the belt at the time of an automatic package was investigated by the approach shown below about each obtained stretch film. The result is shown in a table 1.

Bleeding: Each stretch film was left for 14 days at 50 degrees C, and it measured in Hayes according to JISK7105 after that. This investigates the transparency of a film. Salability is inferior when 5 is exceeded. 2.5 or less thing is [ five especially or less ] desirable.

\*\*\*\*\*: -- a roll-like stretch film product -- 50 degrees C -- 14 days -- leaving it -- after that -- a hand -- \*\*\*\* from a roll -- the bottom. The condition of \*\*\*\* at this time was investigated.

O As for x with heavy \*\*\*\*, \*\* with light \*\*\*\* shows \*\* with very heavy \*\*\*\*.

[0024] Overlap nature: The automatic package of the tray made from styrene foam with a 33cm [ 23cm by ] x height of 3cm was carried out with each stretch film with a width of face of 350mm using stretch automatic packer AW-3600 by Teraoka elaborate incorporated company. The lap condition of the film at the base of a tray at this time was investigated. O x in which \*\* with a 5-7cm lap in which O has a 3-5cm lap has a 1-3cm lap shows \*\* without a lap. This is evaluating the stress delay manifestation nature of a film indirectly.

[0025] The wrinkling of a tray: The automatic package of the tray made from styrene foam with a 33cm [ 23cm by ] x height of 3cm was carried out with each stretch film with a width of face of 350mm using stretch automatic packer AW-3600 by Teraoka elaborate incorporated company. The wrinkling of the film on the top face of a tray at this time was investigated. O a wrinkling -- there is nothing -- very -- fitness and O -- a wrinkling -- almost -- there is nothing -- very -- fitness and \*\* -- \*\* in which close [ a wrinkling's ] is is shown in whole x in which a close wrinkling is selectively.

[0026] The tear of the film at the time of a package: The automatic package of the 100 packs [ every ] tray made from styrene foam with a 33cm [ 23cm by ] x height of 3cm was carried out with each stretch film with a width of face of 350mm using stretch automatic packer AW-3600 by Teraoka elaborate incorporated company, respectively. The tear condition of the film at this time was investigated. O The pack with which, as for 1 - 2 pack \*\*\*\* and \*\*, the pack nothing torn among 100 packs and the pack which O lost into 100 packs were torn into 100 packs shows \*\* in which 3 - 5 pack \*\*\*\* and x have 6 or more \*\*\*\*s of the packs with which it was torn into 100 packs.

[0027] The omission of the film at the time of a package: It examined using stretch automatic packer AW-3600 by Teraoka elaborate incorporated company. The presser-foot belt of this automatic packer was started on both sides of the stretch film with a width of face of 350mm, and the omission of the film from the presser-foot belt when carrying out the stretch of the film 50% was investigated. O x to which a film did not escape from the presser-foot belt and which escaped from \*\* selectively [ a film ] from a presser-foot belt shows \*\* to which the film fell out

from the presser-foot belt thoroughly.

[0028]

[A table 1]

	実施例							比較例			
	1	2	3	4	5	6	7	1	2	3	4
(両外層)											
EVA	100	100	100	100	100	100	100	100	100	100	100
両外層の各層厚 $\mu\text{m}$	2	3	2	2	2	2.8	2	2	2	2	2
(中心層)											
カカロイKS-221P	90	90	80			90	70		80		35
カカロイKS-081P				80	60						
PERT-310]								90			
ノーブレンWF732-1										80	
ウベタックUT2780					20						55
アルコン P-140	10	10	20	20	20	10	30	10		20	10
アルコン P-125									20		
中心層の層厚 $\mu\text{m}$	6	4	6	6	6	8.4	6	6	6	6	6
中心層の層比 %	60	40	60	60	60	60	60	60	60	60	60
(フィルムの物性)											
ブリード	1.5	1.5	1.8	2.5	2.0	1.5	2.5	1.6	6.5	1.7	2.0
解反性	○	○	○	○	○	○	○	○	×	○	○
オーバーラップ性	◎	○	◎	△	◎	○	◎	×	△	×	×
包装時のフィルムのしわ	◎	○	◎	△	◎	○	◎	○	◎	△	△
包装時のフィルムの破れ	○	◎	○	○	○	◎	○	○	○	○	△
包装機ベルトからの抜け	○	○	○	○	○	○	○	○	○	×	○

[0029]

[Effect of the Invention] Even if the crystalline polypropylene resin of the high numeric value called 2 the bending elastic modulus of 200-500Ns/mm is used for the stretch film for food packing of this invention, when softening temperature blends petroleum resin or its hydrogenation object 130 degrees C or more, its transparency is good, it has stress delay manifestation nature, package workability is excellent, and package workmanship is also good [ a stretch film ]. Moreover, what covered the tray which contained food with this film is excellent in finger push stability. Moreover, it excels in cut nature and the pars-basilaris-ossis-occipitalis seal nature at the time of a tray package, and a feeling of a stretch is also good.

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TECHNICAL FIELD

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[Field of the Invention] This invention relates to the stretch film for food packing. Furthermore, it is related with the stretch film for food packing which makes a subject the polyolefine system resin which was excellent in package workability and stretchable [ of package workmanship / good ] in detail.

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## PRIOR ART

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[Description of the Prior Art] Food, such as garden stuff, a fresh fish, and prime meat, is put into a tray, and the method packed [ is covered and ] and sold with the film for a package (stretch film) from on the is used abundantly in the supermarket etc. this package is put from on the tray containing food, carrying out the stretch of the stretch film, it is a tray bottom outside side, and films are carried out by joining superposition (being the so-called -- it overlapping -- making) and its part. Although this package is performed manually or the automatic packer is performing, in an automatic package, whether this package can be performed smoothly and whether it becomes workmanship beautiful again especially depend at the property of a stretch film. [0003] Although the plasticized-polyvinyl-chloride film of 2 has been conventionally used abundantly the bending modulus of elasticity of 80-180Ns/mm at this stretch film, it begins to be regarded as questionable generating hydrogen chloride gas at the time of incineration, that the contained plasticizer may be eluted, etc., therefore a polyvinyl chloride film is a non-plasticizer, and development of the resin film which replaces a polyvinyl chloride film, especially a polyolefine system resin film is furthered. Although the stretch film improved [ thing / which the low-density-polyethylene resin stretch film and the ethylene-vinylacetate copolymer stretch film were proposed / thing /, and the copolymer of ethylene and/or a propylene, and alpha olefins, such as butene-1, a hexene -1, and 4-methyl pentene -1, was further used / thing / as the main layer, for example, and made the ethylene-vinylacetate copolymer layer form in the both sides ] is proposed, There is a problem in points, such as stretchable, transparency, flexibility, deformation recoverability, and cut nature, and the same outstanding package workability as the case where it is a polyvinyl chloride system resin stretch film, and package workmanship cannot be acquired.

[0004] Furthermore, using the mixture of polypropylene and petroleum resin for the stretch film for food packing in recent years is proposed. That is, a main layer consists of a resin constituent containing the propylene system polymer which has the specific amount of heat of crystallization and petroleum resin, terpene resin, coumarone-indene resin, rosin resin, or those hydrogenation derivatives, and the multilayer stretch film for a package with a specific storage modulus and a specific loss tangent is proposed (JP,9-154479,A). Moreover, both external layers consist of ethylene system polymers, and the stretch film for food packing with which a main layer consists of mixture of amorphous polypropylene and crystalline polypropylene and a resin constituent which contains petroleum resin or its hydrogenation derivative in a list is proposed (JP,11-115122,A).

[0005] By the way, the homopolymer of the criterion of a propylene has about 1300Ns /of bending elasticity modulus of 2 (measurement by JISK7208) mm. Thus, the polypropylene with a large bending modulus of elasticity is too hard as a raw material of a stretch film, even if a stretch film made from this blends petroleum resin etc., it cannot carry out a stretch smoothly with automatic packaging machinery, therefore causes trouble to a package, and package workmanship is not enough [ a stretch film ], either. Then, in the stretch film for food packing made from a propylene system polymer, the propylene system polymer which has the bending modulus of elasticity of two or less [ 200Ns //mm ] equivalent to plasticized polyvinyl chloride from the former attracted attention, and it has been adopted from the thing usable as it is with

the stretch wrapping machine which was adapted for plasticized polyvinyl chloride. However, when it hangs on a stretch wrapping machine even if it blends petroleum resin etc. since a with a bending elastic modulus [ or less / 200Ns //mm / 2 ] propylene system polymer has large rubber elasticity, it has the so-called difficulty which is hard to overlap (it will return by the time it carries out welding, even if it makes it overlap), and, generally its cost is high. In addition, with two or less [ 200Ns //mm ] bending elastic modulus, although cost of atactic polypropylene is also cheap, since it contains a low molecular weight constituent, if it is blended so much, a low molecular weight constituent will carry out bleeding of it on the surface of a stretch film, and it has the trouble of clouding a film.

[0006] Moreover, in the stretch film for food packing, although petroleum resin or its hydrogenation object is blended with the propylene system polymer used as a main layer, give the retarded elasticity to a film, raise glass transition temperature, the crystallinity of a propylene system polymer is reduced or it is known that there is an operation which raises the extensibility in ordinary temperature, petroleum resin or its hydrogenation object carries out bleeding on the surface of a stretch film, and there is a trouble of clouding a film.

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[Translation done.]

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EFFECT OF THE INVENTION

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[Effect of the Invention] Even if the crystalline polypropylene resin of the high numeric value called 2 the bending elastic modulus of 200-500Ns/mm is used for the stretch film for food packing of this invention, when softening temperature blends petroleum resin or its hydrogenation object 130 degrees C or more, its transparency is good, it has stress delay manifestation nature, package workability is excellent, and package workmanship is also good [ a stretch film ]. Moreover, what covered the tray which contained food with this film is excellent in finger push stability. Moreover, it excels in cut nature and the pars-basilaris-ossis-occipitalis seal nature at the time of a tray package, and a feeling of a stretch is also good.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] This invention was made in view of the above-mentioned situation, has the outstanding transparency, has stress delay manifestation nature, and aims at offering the stretch film for food packing with comparatively cheap cost which is excellent in package workability and can acquire good package workmanship.

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MEANS

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[Means for Solving the Problem] this invention persons use the resin constituent containing a propylene system polymer and petroleum resin, or its hydrogenation object as a main layer. The result which took lessons from the stretch film for food packing which prepared the ethylene system polymer layer in both the outside and which was inquired variously, When the comparatively high petroleum resin which a bending elastic modulus uses 200-500Ns /of propylene system polymers of 2 for a raw material mm, and softening temperature says to this as 130 degrees C or more, or its hydrogenation object is mixed Transparency was good, carried out the knowledge of excelling in package workability and being able to obtain the good stretch film which carries out package \*\*\*\*\*, and completed this invention.

[0009] Namely, this invention is a stretch film for food packing which consists of at least three layers of a main layer and both external layers. At least one layer of the above-mentioned main layer consists of resin constituents which made the subject mixture of the weight rate of 60-95:40-5 with the crystalline polypropylene resin of 2 and petroleum resin of 130 degrees C or more of softening temperatures with a bending elastic modulus of 200-500Ns [/mm ], or its hydrogenation object. Moreover, it is the stretch film for food packing which both the above-mentioned external layers consist of polyethylene system resin, and is characterized by for the total thickness being 7-15 micrometers, and the layer ratio of a main layer being 40 - 90%. Moreover, the above-mentioned resin constituent contains a with a bending elastic modulus [ or less / 500Ns //mm / 2 ] amorphous polypropylene resin, and this invention is a stretch film for food packing whose blending ratio of coal of this amorphous polypropylene resin is a weight rate of 0-40 to the mixture 100-60 of a polypropylene resin, petroleum resin, or its hydrogenation object. The above-mentioned amorphous polypropylene resin is the copolymer of a propylene and butene-1, and its copolymerization rate of butene-1 is [ 20 or less % of the weight of an amorphous polypropylene resin ] desirable.

[0010]

[Embodiment of the Invention] This invention is a stretch film for food packing which consists of at least three layers of a main layer and both external layers. At least one layer of the above-mentioned main layer consists of resin constituents which make a subject mixture which contains bending elastic-modulus the crystalline polypropylene resin, the petroleum resin of 130 degrees C or more of softening temperatures, or its hydrogenation object of 2 of 200-500Ns/mm at a weight rate of 60-95:40-5. The weight rate of the mixture of the crystalline polypropylene resin occupied in this resin constituent, petroleum resin, or its hydrogenation object is 60 % of the weight or more preferably 50% of the weight or more. Moreover, it is good to \*\*\*\* more preferably the rate of occupying in the above-mentioned resin constituent of the above-mentioned crystalline polypropylene resin to 50% of the weight or more. in addition, the above-mentioned bending elastic modulus -- a measuring method given in JIS K7208 -- it is the measured value.

[0011] Generally the crystalline polypropylene resin of 2 constructs a bridge the bending elastic modulus of 200-500Ns/mm in the soft segment to which copolymerization of the hard segment which consists of polypropylene and a propylene and ethylene, or the alpha olefin (except for a propylene) was carried out. After carrying out the polymerization of a hard segment and the soft

segment independently, a bridge can be made to be able to construct, or the polymerization of a hard segment and the soft segment is carried out, they can be made to be able to construct a bridge in one polymerization process, and it can manufacture. Although what was manufactured by the former manufacture approach is inferior to transparency, as for what was manufactured by the latter manufacture approach, transparency is used preferably well. This crystalline polypropylene resin is marketed by the brand name of "KATAROI KS-221P" and "KATAROI KS-081P" for example, from Montel JIEPIO, Inc.

[0012] This bending elastic modulus of 200–500Ns/mm, since the crystalline polypropylene resin of 2 is excellent in transparency and has an advantage with cheap cost, it is suitable. Moreover, even if it adds the petroleum resin or its hydrogenation object of 130 degrees C or more of softening temperatures, when hanging and packing to automatic packaging machinery, the so-called overlap nature is bad, since the rubber elasticity of this resin is strong when a with a bending elastic modulus [ or less / 200Ns //mm / 2 ] crystalline polypropylene resin is used. Moreover, when a with a bending elastic modulus [ or more / 500Ns //mm / 2 ] crystalline polypropylene resin is used and it hangs and packs to automatic packaging machinery even if it adds the petroleum resin or its hydrogenation object of 130 degrees C or more of softening temperatures since this resin is hard, it is hard to overlap, and Siwa is caused or it escapes from the belt of packaging machinery. The activity of the crystalline polypropylene resin of 2 is desirable the bending elastic modulus of 200–300Ns/mm from a viewpoint of this overlap nature.

[0013] The petroleum resin used by this invention or its hydrogenation object is thermoplastics which carried out the polymerization of the decomposition oil fraction generated by the pyrolysis of petroleum, and was solidified. There are a fat group system which used C5 fraction as the raw material, an aroma group system which used C9 fraction as the raw material or both copolymerization system, and a dicyclopentadiene system. Moreover, what hydrogenated these is used. This petroleum resin or its hydrogenation object is marketed by brand names, such as Al Cong (the Arakawa chemical-industry incorporated company make), high RETTSU, and PETOROJIN (all are the Mitsui Chemicals Industries make). Hydrogenated C9 system petroleum resin is used preferably. moreover, softening temperature -- \*\* 130 degrees C or more -- a thing 140 degrees C or more is used preferably. Thus, if the high petroleum resin or its hydrogenation object of softening temperature is used, since will compare when softening temperature uses a less than 130-degree C thing, and stress delay manifestation nature will size-come to come and it will further be hard coming to carry out bleeding, transparency is good.

[0014] Moreover, the rate with the crystalline polypropylene resin of 2, petroleum resin, or its hydrogenation object is a weight rate of 60–95:40–5 the bending elastic modulus of 200–500Ns/mm. The rate of a crystalline polypropylene resin passes with bleeding at 60 or less % of the weight, transparency gets worse by the time, and at 95 % of the weight or more, since stress delay manifestation nature is insufficient, overlap nature is bad.

[0015] Although at least one-layer main layer consists of a resin constituent which contains as a subject the mixture which mixed the bending elastic-modulus the crystalline polypropylene resin, the above-mentioned petroleum resin of 130 degrees C or more of softening temperatures, or its above-mentioned hydrogenation object of 2 of 200–500Ns/mm at a weight rate of 60–95:40–5, it may blend a with a bending elastic modulus [ or less / 500Ns //mm / 2 ] amorphous polypropylene resin with this resin constituent. Cost can be lowered by blending this amorphous polypropylene resin. The mixture of a crystalline polypropylene resin, petroleum resin, or its hydrogenation object and the blending ratio of coal with the above-mentioned amorphous polypropylene resin are 100–60:0–40 (weight section).

[0016] The above-mentioned amorphous polypropylene resins are a polypropylene and propylene-ethylene copolymer, a propylene-butene-1 copolymer, a propylene-butene-1-ethylene copolymer, propylene-hexene -1 copolymer, etc. Especially, it is the copolymer of a propylene and butene-1 and 20 or less % of the weight of an amorphous polypropylene resin has the desirable copolymerization rate of butene-1. That by which these are marketed by the brand name of UBETAC UT 2780 and UBETAC UT 2385 from Ube Rexene, Inc. is used.

[0017] In this invention, the layer which consists of polyethylene system resin as both external

layers of a main layer is prepared. This polyethylene system resin For example, ethylene propylene rubber, An ethylene-butene-1 copolymer, ethylene-pentene -1 copolymer, Ethylene-hexene -1 copolymer, an ethylene-vinylacetate copolymer, An ethylene methyl-acrylate copolymer, an ethylene ethyl-acrylate copolymer, An ethylene acrylic-acid copolymer, an ethylene methacrylic acid methyl copolymer, An ethylene methacrylic acid ethyl copolymer, an ethylene methacrylic acid copolymer, an ethylene methacrylic acid ethyl copolymer, ionomer resin, low density polyethylene, and a line -- they are resin films, such as low density polyethylene, super-low density polyethylene, medium density polyethylene, and high density polyethylene. Since the stretch film for food packing can be created without spoiling the property of the main layer which especially the ethylene-vinylacetate copolymer film mentioned above, it is desirable.

[0018] 7-15 micrometers of sum totals of the thickness of a main layer and the thickness of the layer of the both sides, i.e., the total thickness of a stretch film, is 8-12 micrometers preferably. Moreover, the percentage of the thickness of a main layer to the layer ratio, i.e., total thickness, of a main layer is 50 - 80% preferably 40 to 90%. Moreover, even if the thickness of both outer layers is the same, it may differ.

[0019] In order to give the property for which it asks as a stretch film for food packing, for example, fog resistance, antibacterial, slippage, adhesiveness, etc. to this invention film, it is desirable to blend an antifogger, an antimicrobial agent, lubricant, a binder, etc. if needed. As an antifogger, monochrome or diglycerol fatty acid ester, polyglyceryl fatty acid ester, a sorbitan fatty acid ester, sucrose fatty acids ester or these ethyleneoxide addition products, the polyoxyalkylene ether, etc. are used. Aliphatic series system hydrocarbon resin, rosin, aromatic series system petroleum resin, etc. are used for a tackifier.

[0020] The stretch film for food packing of this invention is manufactured by inflation molding or extrusion molding using a T die, as the resin constituent which contains as a subject the mixture with which the crystalline polypropylene resin and softening temperature of 2 mixed petroleum resin or its hydrogenation object 130 degrees C or more at a weight rate of 60-95:40-5 the bending elastic modulus of 200-500Ns/mm is used as a main layer and an ethylene system polymer is located in the both-sides side. In the case of inflation molding, the mold goods of the acquired shape of the tube are cleared, and it is made a film. Then, this film is cut out to predetermined width of face, and it rolls round on a roll, and considers as a product.

[0021]

[Working Example(s) and Comparative Example(s)] The stretch film for food packing was manufactured by each presentation rate shown in one to examples 1-7 and example of comparison 4 table 1, and class thickness. In a table 1, EVA is the ethylene-vinylacetate copolymer of 15.8 % of the weight of vinyl acetate units. KATAROI KS-221P (brand name) and KATAROI KS-081P (brand name) are crystalline polypropylene made from Montel JIEPIO, Inc., and 270Ns /of the bending elastic modulus are [ mm ] 2 and 350N/mm<sup>2</sup>, respectively. PERT-310J (brand name) are a low crystallinity propylene system polymer by Tokuyama, Inc., it is the block copolymer of a propylene-ethylene-propylene mold, and 160Ns /of the bending elastic modulus are [ mm ] 2. No BUREN WF 732-1 (brand name) is a crystalline propylene polymer by Sumitomo Chemical Co., Ltd., it is the propylene-ethylene random copolymer of 97 % of the weight of contents of a propylene unit, and 1200Ns /of the bending elastic modulus are [ mm ] 2. UBETAC UT 2780 (brand name) is amorphous polyolefine system resin by Ube Rexene, Inc., it is the propylene-butene-1 copolymer which contains [ a propylene ] 35 % of the weight for 65 % of the weight and butene-1, and 110Ns /of bending elastics modulus are [ mm ] 2. Moreover, Al Cong P-140 (brand name) and Al Cong P-125 (brand name) are alicycle group saturated hydrocarbon resin by Arakawa chemical-industry incorporated company, and softening temperatures are 140 degrees C and 125 degrees C, respectively.

[0022] The resin constituent shown in a table 1 was used for the main layer, the ethylene-vinylacetate copolymer which blended 2 % of the weight of antifogger glycerol oleate was used for the outer layer, and the stretch film for food packing was created. That is, the above-mentioned resin constituent was used as the main layer, inflation molding was extruded and carried out with the round-head die so that the ethylene-vinylacetate copolymer of an outer



layer might be located in the both sides, and the main layer and the outer layer of the both sides created the stretch film for food packing of the thickness shown in a table 1, respectively, rolled round on the roll, and considered as the product.

[0023] The omission from bleeding, \*\*\*\*\*, overlap nature, the wrinkling of a tray, the tear at the time of a package, and the belt at the time of an automatic package was investigated by the approach shown below about each obtained stretch film. The result is shown in a table 1.

Bleeding: Each stretch film was left for 14 days at 50 degrees C, and it measured in Hayes according to JISK7105 after that. This investigates the transparency of a film. Salability is inferior when 5 is exceeded. 2.5 or less thing is [ five especially or less ] desirable.

\*\*\*\*\*: -- a roll-like stretch film product -- 50 degrees C -- 14 days -- leaving it -- after that -- a hand -- \*\*\*\* from a roll -- the bottom. The condition of \*\*\*\* at this time was investigated. O As for x with heavy \*\*\*\*, \*\* with light \*\*\*\* shows \*\* with very heavy \*\*\*\*.

[0024] Overlap nature: The automatic package of the tray made from styrene foam with a 33cm [ 23cm by ] x height of 3cm was carried out with each stretch film with a width of face of 350mm using stretch automatic packer AW-3600 by Teraoka elaborate incorporated company. The lap condition of the film at the base of a tray at this time was investigated. O x in which \*\* with a 5-7cm lap in which O has a 3-5cm lap has a 1-3cm lap shows \*\* without a lap. This is evaluating the stress delay manifestation nature of a film indirectly.

[0025] The wrinkling of a tray: The automatic package of the tray made from styrene foam with a 33cm [ 23cm by ] x height of 3cm was carried out with each stretch film with a width of face of 350mm using stretch automatic packer AW-3600 by Teraoka elaborate incorporated company. The wrinkling of the film on the top face of a tray at this time was investigated. O a wrinkling -- there is nothing -- very -- fitness and O -- a wrinkling -- almost -- there is nothing -- very -- fitness and \*\* -- \*\* in which close [ a wrinkling's ] is is shown in whole x in which a close wrinkling is selectively.

[0026] The tear of the film at the time of a package: The automatic package of the 100 packs [ every ] tray made from styrene foam with a 33cm [ 23cm by ] x height of 3cm was carried out with each stretch film with a width of face of 350mm using stretch automatic packer AW-3600 by Teraoka elaborate incorporated company, respectively. The tear condition of the film at this time was investigated. O The pack with which, as for 1 - 2 pack \*\*\*\* and \*\*, the pack nothing torn among 100 packs and the pack which O lost into 100 packs were torn into 100 packs shows \*\* in which 3 - 5 pack \*\*\*\* and x have 6 or more \*\*\*\*\*s of the packs with which it was torn into 100 packs.

[0027] The omission of the film at the time of a package: It examined using stretch automatic packer AW-3600 by Teraoka elaborate incorporated company. The presser-foot belt of this automatic packer was started on both sides of the stretch film with a width of face of 350mm, and the omission of the film from the presser-foot belt when carrying out the stretch of the film 50% was investigated. O x to which a film did not escape from the presser-foot belt and which escaped from \*\* selectively [ a film ] from a presser-foot belt shows \*\* to which the film fell out from the presser-foot belt thoroughly.

[0028]

[A table 1]

	実施例							比較例			
	1	2	3	4	5	6	7	1	2	3	4
(両外層)											
EVA	100	100	100	100	100	100	100	100	100	100	100
両外層の各層厚 $\mu\text{m}$	2	3	2	2	2	2.8	2	2	2	2	2
(中心層)											
カカロイKS-221P	90	90	80			90	70		80		35
カカロイKS-081P				80	60						
PERT-310J								90			
ノーブレンWF732-1										80	
ウベタックUT2780					20						55
アルコン P-140	10	10	20	20	20	10	30	10		20	10
アルコン P-125									20		
中心層の層厚 $\mu\text{m}$	6	4	6	6	6	8.4	6	6	6	6	6
中心層の層比 %	60	40	60	60	60	60	60	60	60	60	60
(フィルムの物性)											
ブリード	1.5	1.5	1.8	2.5	2.0	1.5	2.5	1.6	6.5	1.7	2.0
解反性	○	○	○	○	○	○	○	○	×	○	○
オーバーラップ性	◎	○	◎	△	◎	○	◎	×	△	×	×
包装時のフィルムのしわ	◎	○	◎	△	◎	○	◎	○	◎	△	△
包装時のフィルムの破れ	○	◎	○	○	○	◎	○	○	○	○	△
包装機ベルトからの抜け	○	○	○	○	○	○	○	○	○	×	○

[Translation done.]